UNITED STATES PATENT AND TRADEMARK OFFICE

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EXAMINER
AHMED, ENAM

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 June 2008*.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12,14-20 and 22-26* is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-12, 14-20 and 22-26* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
        1.☐ Certified copies of the priority documents have been received.
        2.☐ Certified copies of the priority documents have been received in Application No. _____.
        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

Non - Final

This office action is in response to applicants RCE filed on 6/17/08.

Claims 13, 21 and 27 have been cancelled.

Claims 1-12, 14-20 and 22-26 are pending in this application.

The objection to the claim has been withdrawn.

Response to amendment

Applicants arguments have been fully considered, and are found not found persuasive.

Response to applicants remarks

On page 11, the applicant mentions Wiencko does not mention anything else about the likelihood of drive failure and clearly does not mention that updating of redundant data should be based upon the likelihood of a disk failure.

The Examiner disagrees with the statement, and points out there are several sections which cover disk failure predictability and redundant controllers for updating. Thus, the Wiencko reference teaches the likelihood of drive failure and that updating of redundant data should be based upon the likelihood of a disk failure (column 1, line 57 - column 2, line 61) and (column 3, lines 26-32).

On page 12, the applicant mentions the proposed combination of Dunn, Wiencko, and Minow does not teach or suggest "maintaining a directory of updated data blocks, said updated data blocks comprising ones of said data blocks that have received a write operation and a corresponding write operation to a corresponding redundant storage block has not been made" and "if said first disk is predicted to fail in said disk array, only updating said redundant storage block corresponding to said updated blocks".

The Examiner disagrees with the statement, and points out the Dunn reference teaches array controllers as well as memory for storing updated data blocks with write operations performed. Further, the Dunn reference teaches updating corresponding data blocks as well. Futher, in the Wiencko reference there are several sections which cover disk failure predictability and redundant controllers for updating. Thus, the Dunn reference teaches "maintaining a directory of updated data blocks, said updated data blocks comprising ones of said data blocks

that have received a write operation and a corresponding write operation to a corresponding

redundant storage block has not been made" (column 8, line 11 – column 9, line 39). The

Wiencko reference teaches "if said first disk is predicted to fail in said disk array, only updating

said redundant storage block corresponding to said updated blocks" (column 1, line 57 - column

2, line 61) and (column 3, lines 26-32).

35 U.S.C. 103

a.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for

all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wiencko, Jr.

et al. (U.S. Patent No. 6,557,123) in view of Dunn et al. (U.S. Patent No. 6,112,255).

With respect to claim 1, the Wiencko, Jr. et al. reference teaches writing [[a]] at least one

data blocks to s first disk of said disk array(column 15, lines 47-48); asynchronously with

said writing to said first disk, storing at least one of redundant data block corresponding to

said at least one data block in at least one spare disk of said disk array (column 2, lines 30-

47); predicting if said first disk will fail and if said first disk is predicted to fail in said disk

array, only updating redundant storage blocks corresponding to said updated data blocks

(column 1, line 57 - column 2, line 61) and (column 3, lines 26-32). The Wiencko, Jr. et al.

reference does not teach maintaining a directory of updated data blocks, said updated data

blocks comprising ones of said data blocks that have received a write operation and a

corresponding write operation to a corresponding redundant storage block has not been

made. The Dunn et al. reference teaches maintaining a directory of updated data blocks, said

updated data blocks comprising ones of said data blocks that have received a write operation

and a corresponding write operation to a corresponding redundant storage block has not been

made (column 8, line 11 – column 9, line 40). Thus, it would have been obvious to one of

ordinary skill in the art at the time of the invention was made to have combined the

references Wiencko, Jr. et al. and Dunn et al. to incorporate maintaining a directory of

updated data blocks, said updated data blocks comprising ones of said data blocks that have

received a write operation and a corresponding write operation to a corresponding redundant

storage block has not been made into the claimed invention. The motivation for maintaining

a directory of updated data blocks, said updated data blocks comprising ones of said data

blocks that have received a write operation and a corresponding write operation to a

corresponding redundant storage block has not been made is for achieving a high degree of

reliability.

With respect to claim 2, all of the limitations of claim 1 have been addressed. The

Wiencko, Jr. et al. reference does not teach wherein said maintaining of said directory is

based on a function. The Dunn et al. reference teaches wherein said maintaining of said

directory is based on a function (column 8, line 11 – column 9, line 40). Thus, it would have

been obvious to one of ordinary skill in the art at the time of the invention was made to have

combined the references Wiencko, Jr. et al. and Dunn et al. to incorporate wherein said

maintaining of said directory is based on a function into the claimed invention. The

motivation for wherein said maintaining of said directory is based on a function is for

achieving a high degree of reliability.

     With respect to claim 3, the Wiencko, Jr. et al. reference teaches wherein said function

comprises a mathematical function (column 14, lines 35-39).

     With respect to claim 4, the Wiencko, Jr. et al. reference teaches wherein said function

comprises an error correcting code (column 7, lines 1-4).

     With respect to claim 5, all of the limitations of claim 1 have been addressed. The

Wiencko, Jr. et al. reference does not teach said maintaining of said directory comprising

maintaining an address of [[a]] said data blocks corresponding to a set of addresses of said

redundant data blocks that require updating. The Dunn et al. reference teaches said

maintaining of said directory comprising maintaining an address of [[a]] said data blocks

corresponding to a set of addresses of said redundant data blocks that require updating

(column 8, line 11 – column 9, line 40). Thus, it would have been obvious to one of ordinary

skill in the art at the time of the invention was made to have combined the references

Wiencko, Jr. et al. and Dunn et al. to incorporate said maintaining of said directory

comprising maintaining an address of [[a]] said data blocks corresponding to a set of

addresses of said redundant data blocks that require updating into the claimed invention. The

motivation for said maintaining of said directory comprising maintaining an address of [[a]]

said data blocks corresponding to a set of addresses of said redundant data blocks that require

updating is for achieving a high degree of reliability.

With respect to claim 6, the Wiencko, Jr. et al. reference teaches wherein said disk array

comprises at least one a RAID array (column 24, lines 16-34).

With respect to claim 7, the Wiencko, Jr. et al. reference teaches comprising

reconstructing data stored on a failed disk onto at least one replacement disk (column 2, lines

10-11) and (column 6, lines 64-67).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wiencko, Jr. et al.

(U.S. Patent No. 6,557,123), Dunn et al. (U.S. Patent No. 6,112,255) further in view of

Minow et al. (U.S. Patent No. 6,021,462).

With respect to claim 8, all of the limitations of claim 1 have been addressed. The

Wiencko, Jr. et al. does not teach wherein if an amount of said updated data block exceeds a

fraction of said data stored in said disk array, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks. The Minow et al. reference teaches wherein if an amount of said updated data block exceeds a fraction of said data stored in said disk array, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks (column 1, lines 30-58). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to have combined the references Wiencko, Jr. et al. and Minow et al. to incorporate wherein if an amount of said updated data block exceeds a fraction of said data stored in said disk array, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks into the claimed invention. The motivation for wherein if an amount of said updated data block exceeds a fraction of said data stored in said disk array, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks is for achieving a high degree of reliability.

Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wiencko, Jr. et al. (U.S. Patent No. 6,557,123), Dunn et al. (U.S. Patent No. 6,112,255) in view of Sasamoto et al. (U.S. Patent No. 6,442,711).

With respect to claim 9, all of the limitations of claim 1 have been addressed. The Wiencko, Jr. et al. reference does not teach wherein whenever the load on the disk array is below a threshold value, said method further comprises only updating said redundant storage

blocks corresponding to said updated data blocks. The Sasamoto et al. reference teaches wherein whenever the load on the disk array is below a threshold value, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks (column 1, lines 46-55). Thus it would have been obvious at the time of the invention was made to a person having ordinary skill in the art at the time of the invention was made to have combined the references Wiencko, Jr. et al. and Sasamoto et al. to incorporate wherein whenever the load on the disk array is below a threshold value, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks into the claimed invention. The motivation for wherein whenever the load on the disk array is below a threshold value, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks is for optimizing performance.

With respect to claim 10, all of the limitations of claim 1 have been addressed. The Wiencko, Jr. et al. reference does not teach comprising preferentially updating redundant data blocks that are less likely to be altered again are preferentially updated. The Dunn et al. reference teaches comprising preferentially updating redundant data blocks that are less likely to be altered again are preferentially updated (column 2, lines 11-29). Thus it would have been obvious at the time of the invention was made to a person having ordinary skill in the art at the time of the invention was made to have combined the references Wiencko, Jr. et al. and Dunn et al. to incorporate comprising preferentially updating redundant data blocks that are less likely to be altered again are preferentially updated into the claimed invention.

The motivation for comprising preferentially updating redundant data blocks that are less

likely to be altered again are preferentially updated is for optimizing performance.

Claims 11-12 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Dunn et al. (U.S. Patent No. 6,112,255) in view of Wiencko, Jr. et al. (U.S. Patent No.

6,557,123).

With respect to claim 11, the Dunn et al. reference teaches periodically storing redundant

data into data blocks located on a spare disk (column 2, lines 30-47); determining which of said

data blocks comprise updated data blocks, said updated data blocks comprising ones of said

updated data blocks of said first disk column 8, line 11 – column 9, line 39). The Dunn et al.

reference does not teach monitoring disks in said disk array for predicted disk failures and if a

first disk is predicted to fail in said disk array, only updating redundant storage blocks

corresponding to said updated data blocks of said first disk. The Wiencko, Jr et al. reference

teaches monitoring disks in said disk array for predicted disk failures and if a first disk is

predicted to fail in said disk array, only updating redundant storage blocks corresponding to said

updated data blocks of said first disk (column 1, line 57 - column 2, line 61) and (column 3, lines

26-32). Thus, it would have been obvious to one of ordinary skill in the art at the time of the

invention was made to have combined the references Dunn et al. and Wiencko, Jr. et al. to

incorporate monitoring disks in said disk array for predicted disk failures and if a first disk is

predicted to fail in said disk array, only updating redundant storage blocks corresponding to said

updated data blocks of said first disk into the claimed invention. The motivation for monitoring

disks in said disk array for predicted disk failures and if a first disk is predicted to fail in said

disk array, only updating redundant storage blocks corresponding to said updated data blocks of

said first disk is for achieving a high degree of reliability.

With respect to claim 12, the Dunn et al. reference wherein said maintaining of said

directory is based on a function (column 8, line 11 – column 9, line 40).

With respect to claim 14, the Dunn et al. reference teaches wherein said disk array

comprises at least one a RAID array (column 1, lines 8-13).

With respect to claim 15, the Dunn et al. reference teaches comprising reconstructing

data stored on a failed disk onto at least one replacement disk (column 3, lines 7-12).

With respect to claim 16, the Dunn et al. reference teaches wherein if an amount of said

updated data block exceeds a fraction of said data stored in said disk array, said method further

comprises only updating said redundant storage blocks corresponding to said updated data blocks

(column 1, lines 30-58).

Claims 19-20 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Dunn et al. (U.S. Patent No. 6,112,255) in view of Wiencko, Jr. et al. (U.S. Patent No.

6,557,123).

With respect to claim 19, the Dunn et al. reference teaches a storage unit operable for periodically storing redundant data into data blocks located on a spare disk (column 2, lines 30-47) and a directory operable for determining which of said data blocks comprises updated data blocks, said updated data blocks comprising ones of said data blocks that have received a write operation and a corresponding write operation to a corresponding redundant storage block has not been made (column 6, line 66 – column 7, line 15) and (column 8, line 11 – column 9, line 40). The Dunn et al. reference does not teach a monitor operable for monitoring the disks in the array for disk failures to occur and a computer operable for updating only redundant storage blocks corresponding to said updated data blocks. The Wiencko, Jr. et al. reference teaches a monitor operable for monitoring the disks in the array for disk failures to occur and a computer operable for updating only redundant storage blocks corresponding to said updated data blocks (column 1, line 57 - column 2, line 61) and (column 3, lines 26-32). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to have combined the references Dunn et al. and Wiencko, Jr. et al. to incorporate a monitor operable for monitoring the disks in the array for disk failures to occur and a computer operable for updating only redundant storage blocks corresponding to said updated data blocks into the claimed invention. The motivation for a monitor operable for monitoring the disks in the array for disk failures to occur and a computer operable for updating only redundant storage blocks corresponding to said updated data blocks is for achieving a hig degree of reliability.

With respect to claims 20, the Dunn et al. reference teaches wherein said directory is maintained based on a function (column 6, line 66 – column 7, line 15) and (column 8, line 11 – column 9, line 40)

With respect to claim 22, the Dunn et al. reference teaches at least one replacement disk operable for storing reconstructed data previously stored on a failed disk (column 3, lines 7-12).

With respect to claim 23, the Dunn et al. reference teaches wherein if an amount of said updated data blocks exceeds a fraction of said data stored in said disk array, said computer is further operable for only updating said redundant storage blocks corresponding to said updated data blocks (column 1, lines 30-58), (column 6, line 66 – column 7, line 15) and (column 8, line 11 – column 9, line 40)

With respect to claims 24, the Dunn et al. reference teaches wherein said disk array comprises at least one a RAID array (column 1, lines 8-13).

Claims 17-18 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunn et al. (U.S. Patent No. 6,112,255), Wiencko, Jr. et al. (U.S. Patent No. 6,557,123) in view of Sasamoto et al. (U.S. Patent No. 6,442,711).

With respect to claims 17 and 25, all of the limitations of claims 12 and 19 have been addressed. The Dunn et al. reference does not teach wherein whenever the load on the disk array is below a threshold value, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks. The Sasamoto et al. reference teaches wherein whenever the load on the disk array is below a threshold value, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks (column 1, lines 46-55). Thus it would have been obvious at the time of the invention was made to a person having ordinary skill in the art at the time of the invention was made to have combined the references Dunn et al. and Sasamoto et al. to incorporate wherein whenever the load on the disk array is below a threshold value, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks into the claimed invention. The motivation for wherein whenever the load on the disk array is below a threshold value, said method further comprises only updating said redundant storage blocks corresponding to said updated data blocks is for optimizing performance.

With respect to claims 18 and 26, the Dunn et al. reference teaches further comprising preferentially updating redundant data blocks that are less likely to be altered again are preferentially updated (column 2, lines 11-29).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Enam Ahmed whose telephone number is 571-270-1729. The examiner can normally be reached on Mon-Fri from 8:30 A.M. to 5:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jacques Louis-Jacques, can be reached on 571-272-6962.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EA

8/27/08

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